CLAIMS

We claim:

1. A semiconductor processing chamber having at least one interior surface comprising electrochemically roughened aluminum or aluminum alloy.

2. The semiconductor processing chamber of Claim 1, wherein said at least one interior surface has a surface roughness ranging from about 100 Ra to about 200 Ra.

3. The semiconductor processing chamber of Claim 2, wherein said surface roughness ranges from about 110 Ra to about 160 Ra.

4. The semiconductor processing chamber of Claim 1, wherein said electrochemically roughened aluminum or aluminum alloy surface has the appearance of rolling hills and valleys, when magnified.

5. The semiconductor processing chamber of Claim 4, wherein the height of said hills ranges from about 8 μm to about 25 μm.

6. The semiconductor processing chamber of Claim 4 or Claim 5, wherein the distance between the center of one hill and the center of an adjacent hill ranges from about 30 μm to about 100 μm.

7. The semiconductor processing chamber of Claim 1, wherein said electrochemically roughened aluminum or aluminum alloy surface underlies a coating selected from the group consisting of an anodized coating, a flame spray-deposited aluminum oxide coating, a ceramic coating, and an anodized coating having a ceramic coating applied thereover.

8. The semiconductor processing chamber of Claim 1, wherein byproducts generated during an etch process or a deposition process adhere to said electrochemically roughened aluminum surface.

9. The semiconductor processing chamber of Claim 1, wherein said semiconductor processing chamber is selected from the group consisting of an etch chamber and a deposition chamber.

10. The semiconductor processing chamber of Claim 9, wherein said semiconductor processing chamber is an etch chamber which is used for etching a material selected from the group consisting of a dielectric material, a metal, and polysilicon.

11. The semiconductor processing chamber of Claim 9, wherein said semiconductor processing chamber is an etch chamber, and wherein fluorine and carbon from an etch process react to form a polymer which adheres to said electrochemically roughened aluminum surface.

12. A processing component for use within a semiconductor processing chamber, wherein said processing component has at least one electrochemically roughened aluminum or aluminum alloy surface.

13. The processing component of Claim 12, wherein said electrochemically roughened aluminum or aluminum alloy surface has a surface roughness ranging from about 100 Ra to about 200 Ra.

14. The processing component of Claim 13, wherein said surface roughness ranges from about 110 Ra to about 160 Ra.

15. The processing component of Claim 12, wherein said electrochemically roughened aluminum or aluminum alloy surface has the appearance of rolling hills and valleys, when magnified.

16. The processing component of Claim 15, wherein the height of said hills ranges from about 8 μm to about 25 μm.

17. The processing component of Claim 15 or Claim 16, wherein the distance between the center of one hill and the center of an adjacent hill ranges from about 30 μm to about 100 μm.

18. The processing component of Claim 12, wherein said electrochemically roughened aluminum or aluminum alloy surface underlies a coating selected from the group consisting of an anodized coating, a flame spray-deposited aluminum oxide coating, a ceramic coating, and an anodized coating having a ceramic coating applied thereover.

19. The processing component of Claim 12, wherein byproducts generated during an etch process or a deposition process adhere to said electrochemically roughened aluminum or aluminum alloy surface.

20. The processing component of Claim 12, wherein said processing component is used within a semiconductor processing chamber selected from the group consisting of an etch chamber and a deposition chamber.

21. The processing component of Claim 20, wherein said semiconductor processing chamber is an etch chamber which is used for etching a material selected from the group consisting of a dielectric material, a metal, and polysilicon.

22. The processing component of Claim 20, wherein said semiconductor processing chamber is an etch chamber, and wherein fluorine and carbon from an etch process react to form a polymer which adheres to said electrochemically roughened surface.

23. The processing component of Claim 12, wherein said processing component is selected from the group consisting of: a wall liner, a cathode liner, a slit valve door, a slit valve liner, a buffer insert, and a gas distribution plate.

24. A semiconductor processing apparatus surface, wherein said surface comprises electrochemically roughened aluminum or aluminum alloy.

25. The semiconductor processing apparatus surface of Claim 24, wherein said surface has a surface roughness ranging from about 100 Ra to about 200 Ra.

26. The semiconductor processing apparatus surface of Claim 25, wherein said surface roughness ranges from about 110 Ra to about 160 Ra.

27. The semiconductor processing apparatus surface of Claim 24, wherein said electrochemically roughened aluminum or aluminum alloy surface has the appearance of rolling hills and valleys, when magnified.

28. The semiconductor processing apparatus surface of Claim 27, wherein the height of said hills ranges from about 8 μm to about 25 μm.

29. The semiconductor processing apparatus surface of Claim 27 or Claim 28, wherein the distance between the center of one hill and the center of an adjacent hill ranges from about 30 μm to about 100 μm.

30. The semiconductor processing apparatus surface of Claim 24, wherein said surface underlies a coating selected from the group consisting of an anodized coating, a flame spray-deposited aluminum oxide coating, a ceramic coating, and an anodized coating having a ceramic coating applied thereover.

31. The semiconductor processing apparatus surface of Claim 24, wherein byproducts generated during an etch process or a deposition process adhere to said electrochemically roughened surface.

32. The semiconductor processing apparatus surface of Claim 31, wherein fluorine and carbon from an etch process react to form a polymer which adheres to said surface.

33. The semiconductor processing apparatus surface of Claim 24, wherein said surface is present on an apparatus component selected from the group consisting of: a wall liner, a cathode liner, a slit valve door, a slit valve liner, a buffer insert, and a gas distribution plate.

34. A method for electrochemically roughening a surface comprising aluminum or an aluminum alloy, including the steps of:

a) immersing said surface in an HCl solution having a concentration ranging from about 1 volume % to about 5 volume %, at a temperature ranging from about 45°C to about 80°C; and

b) applying an electrical charge having a charge density ranging from about 80 amps/ft.^{2} to about 250 amps/ft.^{2} for a time period ranging from about 4 minutes to about 25 minutes.

35. The method of Claim 34, wherein said HCl solution has a concentration ranging from about 1 volume % to about 3 volume %.

36. The method of Claim 35, wherein said temperature of said HCl solution ranges from about 50°C to about 70°C.

37. The method of Claim 34, wherein said HCl solution further includes a chelating agent, and wherein said chelating agent is present at a concentration within the range of about 0.5 volume % to about 3 volume %.

38. The method of Claim 37, wherein said chelating agent is gluconic acid.

39. The method of Claim 34, wherein said charge density ranges from about 120 amps/ft.^{2} to about 250 amps/ft.^{2}.

40. The method of Claim 34, wherein said time period ranges from about 4 minutes to about 20 minutes.

41. The method of Claim 34, wherein said aluminum-comprising surface is an aluminum alloy selected from the group consisting of 6061 and LP.

42. The method of Claim 41, wherein said HCl solution concentration ranges from about 1 volume % to about 1.5 volume %; wherein said temperature of said HCl solution ranges from about 55°C to about 65°C; and wherein said charge density ranges from about 175 amps/ft.^{2} to about 250 amps/ft.^{2} .

43. The method of Claim 42, wherein said HCl solution further includes a gluconic acid chelating agent, which is present at a concentration within the range of about 0.9 volume % to about 1.1 volume %.

44. The method of Claim 43, wherein said time period during which said charge density is present ranges from about 6 minutes to about 12 minutes, and the aluminum alloy is 6061.

45. The method of Claim 43, wherein said wherein said time period during which said charge density is present ranges from about 4 minutes to about 8 minutes, and the aluminum alloy is LP.